

## SPRING HAWK MIGRATION IN EASTERN MEXICO

by

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### Abstract

Hawk migration was witnessed along the eastern coast of Mexico for 23 days from 6 April to 6 May 1978 north of Veracruz. More than 262,000 hawks of 17 species were recorded, mainly *Buteo platypterus* (77%), *Buteo swainsoni* (6.4%), *Cathartes aura* (9.8%), and *Ictinia mississippiensis* (4.7%). A large proportion of the migrants may have passed in March and early April and a few after 6 May. Daily numbers of most species quickly decreased after 27 April. The importance of this flyway was evident from the 13,600 *Pelecanus erythrorhynchos* counted and from the several million other migrant birds seen.

Some behavioral features of migrants are described. The need for further survey work is emphasized.

### Introduction

I know of no accurate and extensive records of migrating North American birds of prey south of the United States border. A huge migration was noted in early autumn 1976 about 15 km north-northwest of Veracruz (Thiollay 1977). This migration was studied in spring 1978, but most of the time was devoted to the ecology of resident raptors with observation of migrants as a sideline.

### Methods

I tried to quantify the hawk migration from 6 April to 6 May 1978 along 20 km of the road leading east-west at a right angle from the coast, from just north of Palma Sola to the valley of Plan de Las Hayas. This unpaved road crossed first the narrow coastal plain, then hills and plateaus to an altitude of about 800 m on the eastern edge of the Sierra Madre Oriental, which rises well over 1,000 m (the Orizaba Peak, just southwest of our area, is 5,563 m above sea level). Steep slopes and canyons in this ridge provide a variety of thermals and updrafts readily used by hawks.

The weather was calm, hot, and clear during 23 of the 31 days spent there although it was sometimes cloudy on the mountains in late afternoon, with light to moderate south wind (optimal conditions for migration). By contrast, the remaining 8 days were cold, with strong north winds and low, dark clouds, but little rain. However, hawks did not stop their migratory movements for more than a few hours.

Three well-trained persons with 10 x 40 binoculars were always involved in searching carefully for migrants. According to the behavior of the migrants (see below), the same procedure was followed every day. During the morning, we waited along the road on the slopes above the coastal plain until the first kettles were detected. We then tried to remain all day in close contact with the flight line, often moving up and down the road within the 20-km section suitable for observation. Thus, the three persons were always together at a place believed to be under the main migrant flow. This was necessary for

accurate counts of large multispecies flocks, but we never knew whether other birds were passing elsewhere, i.e., more than 2 km on either side of our post. The possibility of undetected migrants elsewhere is why our results represent only minimum figures.

Most of the groups were detected at a great distance before they crossed the road, and thus they could be followed for a long time. Their specific composition was first assessed as they circled. Then the total number of individuals was counted when the flock was gliding on a long line. Lastly, the birds were again counted and identified when passing overhead. Only very few distant groups, which we could not reach in time, were estimated. More than 90 percent of the birds seen were actually counted to the nearest 5 or 10 individuals, rarely to the nearest 100 (in the case of huge, dense flocks).

As the temperature increased, most birds flew over the mountain west of the valley Plan de Las Hayas, where the road did not cross. They were then impossible to see. This happened sometimes as early as 2:00 or 3:00 p.m., so a large part of the daily migration was out of sight. On the 8 days when migratory conditions seemed to be best, watching was unsatisfactory because the flight could not be seen. Hence, no attempt was made to study the migration.

Resident raptors in the open habitats of the Palma Sola area included the Turkey Vulture (*Cathartes aura*), Black Vulture (*Coragyps atratus*), White-tailed Kite (*Elanus leucurus*), Common Black Hawk (*Buteogallus anthracinus*), Gray Hawk (*Buteo nitidus*), Roadside Hawk (*Buteo magnirostris*), Short-tailed Hawk (*Buteo brachyurus*), White-tailed Hawk (*Buteo albicaudatus*), Laughing Falcon (*Herpetotheres cachinnans*), Bat Falcon (*Falco ruficularis*), and Aplomado Falcon (*Falco femoralis*). Since local Turkey Vultures were nearly always low-flying, lone birds, they were easily differentiated from the high, northward-flying, migrant flocks. However, local Black Vultures often flew high in groups, even joining migrant raptors for some distance. They were identified as migrants only after we followed them a long time, and many of them, although behaving like migrants, were uncounted if we had doubts about them.

The few local wintering birds which remained at that time were distinguished from migrants by their behavior. They were mainly the American Kestrel (*Falco sparverius*) although the Marsh Hawk (*Circus cyaneus*) and the Sharp-shinned Hawk (*Accipiter striatus*) were also seen. Birds of migrant species seen hunting, roosting, or flying southward were not counted.

## Results

The number of birds actually recorded is given in table 1. If we attempt a rough estimate of the migration which probably occurred during each of the 8 unstudied days (taking the mean number of birds counted on the days just before and just after), we reach a monthly total of about 350,000 hawks, not including the unknown number of birds possibly missed on other days.

The period covered was only a part of the spring hawk migration, which may last from February to the end of May. From the curve of daily numbers recorded, no single species migration period has been completely covered.

Turkey Vulture (*Cathartes aura*). The migration of Turkey Vultures seemed to reach its peak during April, with a daily mean of more than 1,500 birds, although the number decreased rapidly. Flights may begin early in the season since a group of 140 migrants was recorded in Texas one year on 26 January (Schumacher Donohue 1978).

Black Vulture (*Coragyps atratus*). The small number of Black Vultures identified as migrants (with a mean of 22 per day during the first three weeks) declined sharply at the end of April. Similar movements have been recorded in Panama (Heintzelman 1975) and Texas as early as 3 March (Schumacher Donohue 1978).

Osprey (*Pandion haliaetus*). Four hundred Ospreys were recorded, an encouraging number in light of the slowly recovering North American population, especially since this may be a small part of the latter. Ospreys migrate over a wide front in Mexico (Friedman et al. 1950), some winter north of Veracruz (Bent 1961), and the first migrants reach Texas at the end of February. Osprey populations, however, are evidently sparse in western North America (Snow 1974).

Swallow-tailed Kite (*Elanoides forficatus*). The absence of the Swallow-tailed Kite (only two recorded in spring and one in autumn) is surprising because, from its southeastern distribution, one would expect the U.S. population to migrate along the Mexican coast.

Everglade Kite (*Rostrhamus sociabilis*). Although apparently not true migrants, some individual Everglade Kites may wander long distances along the coastal lagoons. Wetmore (1943) also noticed a migrating (?) bird on 1 April in Veracruz.

Mississippi Kite (*Ictinia mississippiensis*). Flocks of the Mississippi Kite were probably missed because they often traveled outside the main flow of migrants. The migration began in the first days of April, reached a maximum in the second half of that month, and continued past 6 May. This corresponds to the extreme dates (28 March and 24 May) given for Texas in 1977 (Schumacher Donohue 1978). The peak recorded in 1978 was far below the 5,130 individuals counted on 5 September 1976 (Thiollay 1977a).

Marsh Hawk (*Circus cyaneus*). A fair proportion of migrant Marsh Hawks may have passed during March (first ones on 7 March in Texas according to Schumacher Donohue 1977), with their number declining in April. None was seen in May.

Sharp-shinned Hawk (*Accipiter striatus*). The daily mean numbers of the migrant Sharp-shinned Hawks were 119 in the first half of April, 33 in the second half, and 5 in the first week of May. In 1977, the true migration began on 25 March in Texas where 220 birds were still counted on 24 and 25 April.

Cooper's Hawk (*Accipiter cooperii*) and Red-shouldered Hawk (*Buteo lineatus*). It is interesting to point out the few Cooper's Hawks and Red-shouldered Hawks that were identified since they belong to rather rare wintering species south of Veracruz.

Broad-winged Hawk (*Buteo platypterus*). The Broad-winged Hawk is by far the most abundant migratory hawk in eastern Mexico. The 202,000 birds counted are but a part of the total North American population, which may amount to more than one million (see huge autumn 1977 migration in Texas [Schumacher Donohue 1978]). The flights gradually decreased throughout the period studied and probably peaked before our arrival. Broad-winged Hawks have been reported on 6 and 9 arch (1975, 1976) with the peak numbers (up to 100,000 a day) from 26 March to 2 April (Kennedy 1977, Schumacher Donohue 1978). Some flocks of migrants have also been recorded along the west coast of Mexico (Friedman et al. (1950) and at the southern tip of Florida (Heintzelman 1975), so this may not be the only migration route followed by the North American Broad-wing population.

Swainson's Hawk (*Buteo swainsoni*). The eastern coast of Mexico is likely to be on the edge of the regular flyway of Swainson's Hawk whose breeding distribution is more western. Flights remained about the same through April, decidedly decreasing from 28

April onward. Kennedy (1977) reported 100 migrants north of the Mexican border as early as 27 March. After 6 May, few additional birds are to be expected.

Red-tailed Hawk (*Buteo jamaicensis*). Surprisingly few Red-tailed Hawks were seen although the North American population is supposed to winter occasionally as far south as Guatemala (Land 1970).

American Kestrel (*Falco sparverius*). The small American Kestrel migrates over a much wider front than the soaring birds and is thus proportionately underrepresented in the counts. It decreased quickly during April (respectively 617, 23 and 11 per day during the first, second, and third decades), and none was seen in May.

Pigeon Hawk (*Falco columbarius*). Migrants are possibly more numerous in March. The latest was recorded on 5 May 1977 in Texas (Schumacher Donohue 1978).

Prairie Falcon (*Falco mexicanus*). The only individual identified (April 7) indicates that this species rarely winters south of Veracruz (Friedman et al. 1950).

Peregrine Falcon (*Falco peregrinus*). The daily mean number of migrant Peregrine Falcons steadily remained around 2 all during the observations. Canadian populations are probably involved. In Texas, Schumacher Donohue (1978) records similar late arrivals.

Table 1. Migrants counted in spring

	APRIL											
	6	7	9	11	12	14	15	16	17	19	20	
<i>Cathartes aura</i>	2,928	2,079	158	2,543	3,192	1,008	1,810	228	592	134	272	
<i>Coragyps atratus</i>	50	21	49	36	28	11	38	1	5	8	6	
<i>Pandion haliaetus</i>	93	20	27	24	28	17	10	34	18	22	23	
<i>Elanoides forficatus</i>												
<i>Nostrihamus sociabilis</i>				2								
<i>Ictinia mississippiensis</i>	10	9	131	550	791	197	322	129	968	250	665	
<i>Circus cyaneus</i>	31	20	52	17	16	4	6	4	7		1	
<i>Accipiter striatus</i>	333	45	65	73	64	104	43	80	263	51	45	
<i>Accipiter cooperi</i>	29	3	2	1	1	2	1		2			
<i>Buteo lineatus</i>	1	1	2	1	1		2		1	2	3	
<i>Buteo platypterus</i>	42,988	28,100	20,320	4,765	8,176	11,630	6,858	32,850	16,830	5,847	1,685	
<i>Buteo swainsoni</i>	3,762	1,628	162	120	862	1,402	3,554	570	576	136	174	
<i>Buteo jamaicensis</i>	3	3										
<i>Falco sparverius</i>	1,402	313	137	76	49	143	63	84	167	54	27	
<i>Falco columbarius</i>	4	1		1							1	
<i>Falco peregrinus</i>	8	2	1		2		1		2		1	
<b>TOTAL</b>	<b>51,642</b>	<b>32,246</b>	<b>21,106</b>	<b>8,209</b>	<b>13,210</b>	<b>14,518</b>	<b>12,708</b>	<b>33,980</b>	<b>19,431</b>	<b>6,504</b>	<b>2,903</b>	

*Non-raptor soaring species*

Mixed with hawks were 762 *Anhinga*, 50 *Phalacrocorax*, 15 *Plegadis*, and 10 *Mycteria*. They were much less numerous than in September 1976 (Thiollay 1977a). The White Pelican (*Pelecanus erythrorhynchos*) deserves a special mention: There were 13,588 counted in 23 days (19,000 estimated for 31 days). This figure is only a part of the whole population since the species winters in the southern United States and along both coasts of Mexico (AOU checklist 1957, Peterson and Chalif 1973), and neither the beginning nor the end of the passage has been seen.

*Behavior of migrants*

Since this work was intended to determine the magnitude of the migration, all my time was devoted to a thorough search and census of the migrants, and no detailed study of their behavior could be done.

Migration began rather late in the morning. Large flocks rarely appeared before 12:00 noon, never before 11:00 a.m., and sometimes after 1:00 p.m. Only some groups of

west of Palma Sola, northern Veracruz (Mexico).

						MAY					TOTAL
23	24	26	27	29	30	1	2	4	5	6	Counted during 23 observation days
385	3,418	1,067	3,642	681	341	62	62	292	325	51	25,820
5	31	4	8	4				8	4		333
4	21	3	7	3	4	2			2	1	380
			1						1		2
10		1					1				14
56	1,238	1,547	2,371	442	219	52	10	55	1,853	142	12,432
2	2		2	2							170
15	11	8	56	41	14	6	1		16	3	1,396
				2		1					45
1	1	1	3	5	1				2		29
1,618	1,970	302	4,984	1,230	3,670	898	68	129	1,429	450	202,147
57	1,135	161	1,779	95	76	34	7	77	68	24	16,684
											6
9	6	3	26	8	1						2,597
											7
2	2	8	2	2	2		3	3	2		48
2,159	7,835	3,105	12,881	2,514	4,328	1,055	152	564	3,702	671	262,110

Vultures or *Buteo*, which had spent the night in the surrounding hills, started between 8:00 and 10:00 a.m. Flights were dependent on weather conditions and usually lasted 2 to 6 hours. In the beginning of the afternoon *Buteo* formed the bulk of the migrants, but in the last two hours small hawks (*Falco*, *Accipiter*) increased markedly, often along with *Ictinia* and *Cathartes* whose large flocks frequently appeared very late (around 5:00 p.m.).

Birds showed their usual migration pattern, soaring to get height, then gliding on long distances and soaring again. Their flyway, however, shifted all day between the coast and the mountains, even without detectable change in local weather conditions. Thus with sunny weather and a south wind the early migrants were seen above the eastern hills. Then they crossed the Palma Sola-Plan de las Hayas road more and more westward, and after 3:00 p.m. they sometimes flew well above the distant mountains. Fortunately this tendency was reversed with north wind and clouds on the high range, and in the afternoon birds drifted toward the coastal plain above which they migrated even when fog covered the hills.

A commonly observed behavior was a reluctance to fly under the dark clouds even if conditions remained favorable. When clouds began to build up over the mountains, the birds tended to fly around them.

*Buteo* and *Cathartes* are strongly gregarious, associating with any other species. *Ictinia* shows intra- but less interspecific attraction and often forms dense monospecific flocks. *Pandion*, *Circus*, *Accipiter*, and *Falco* travel individually even when they are within a short distance of one another or temporarily join other species. Flocks rising quickly attract other birds, especially those flying low, which often turn up to 90° from their primary direction to join them and take advantage of the best thermals.

Each species has its own flight characteristics: Only soaring and gliding for *Cathartes*, occasional flapping for *Buteo*, strong wing beats and long glides for *Ictinia*, mainly rapid, flapping flight for *Falco* and *Accipiter*, etc. As a result, their speeds are different. Mississippi Kites are the fastest of all, flying so quickly that some of their flocks can be overlooked if one is not searching constantly.

Roosting behavior was also very different from one species to another. At the end of the afternoon kestrels went down anywhere, perching on isolated trees. Broad-winged and Swainson's Hawks concentrated over remote wooded slopes, soaring for a while before going down and scattering themselves over a large area. Turkey Vultures appeared shortly before sunset in long lines of several hundred birds gliding slowly, lower and lower, to roost in deep valleys (*barrancas*), sometimes more than 20 birds on the same tree. The flocks of Mississippi Kites often went down very late, perching immediately on 2 or 3 large trees.

As usual, very few of these birds were ever seen hunting, even before departing. In the morning most of them stayed on their roosting sites until 9:00 or 10:00 a.m. If updrafts were not good enough, they began to fly low over the slopes and valleys to search for a suitable updraft, sometimes many kilometers from their roost, and then they went up quickly and disappeared.

### Discussion

Three to four hundred thousand hawks (77% Broad-winged) migrated in April along the northeastern coast of Mexico. It is five times what can be seen in a whole autumn in the best lookouts of North America (Heintzelman 1975, W. S. Clark, pers. comm.) ex-

cept in Texas, and more than anywhere in Europe (Thiollay 1977b). The importance of this flyway is emphasized by the huge and continuous migration of passerines and others, involving often half a million birds a day.

Since the central part of Mexico is a high plateau with elevations of around 2,000 m edged on both sides by high ranges, it is easy to understand why soaring birds concentrate on the coastal slopes of this relief, to enter the United States in Texas. But we have seen that the flight lines could change over a wide front according to the weather and are difficult to fully control because of the few roads crossing these mountains. Moreover, we do not know the magnitude of possible central or western flyways.

Counting migrants is the easiest way to evaluate breeding populations of very large areas. Most if not all the world populations of species such as *Buteo platypterus*, *B. swainsoni* or *Ictinia mississippiensis* cross the Isthmus of Tehuantepec twice yearly. This bridge is the only locality north of Panama suitable to initiate a complete migratory survey. However, a numerous and well-trained team is necessary to control during 3 months some 100 km of hilly country over which hawks are often flying very high.

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\*Ed. Note: N. C. Smith has been working on raptor migration in Panama for some years. See *Smithsonian Institute Report* 7, Winter 1974.



Figure 1. Study area showing presumed and known routes of spring migration.

## COMMENTS ON THE RECOGNITION OF OFFSPRING BY RAPTORS

by

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Stinson (1976) presents anecdotes which suggest that Ospreys (*Pandion haliaetus*) may be able to recognize their own fledged young, and he contrasts his observations with those of Postupalsky and Holt (1975), which suggest that Bald Eagles (*Haliaeetus leucocephalus*) may not recognize their own unfledged young. Although it is possible to argue that recognition, or lack thereof, has not been clearly demonstrated in either paper, let us assume that it has.